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Features of multi-effect evaporation desalination plants

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ABSTRACT

There are three major types of desalination plants that dominate the desalination market. These are multi-stage flash (MSF), reverse osmosis (RO), and multi-effect evaporation (MEE). MSF dominates the desalination market by more than 73% of units producing 4,000 m^3/d (1.06 mgd) and 51% of units producing more than 100 m^3/d (26,420 gpd). RO has about 17.8% of the total desalting capacity of plants producing more than 4,000 m^3/d and about 32.6% of those producing more than 100 m^3/d. There is a great potential toward installing more MEE plants worldwide and specifically in the Arabian Gulf countries. In Saudi Arabia, Saline Water Conversion Co-operation is currently implementing six projects of satellite plants of MEE type et al. Wajh III, Umluj III, Farasan II, Laith I, Qunfudah I with a capacity of 9,000 m^3/d of water for each plant and 18,000 m^3/d for Rabigh II plant. Besides, three planned plants of MEE types at Al-Khafji III, Haqal III and Duba IV with a capacity of 20,000, 9,000, and 9,000 m^3/d, respectively. Marafiq (the Power and Water Utility Company for Jubail and Yanbu) will have a combined power generation and desalination plant with a capacity of 2,750 MW of power and 800,000 m^3/d of water. The 68,190 m^3/d (15 migd) single MEE unit to be furnished by Doosan at Yanbu could revolutionize the competitiveness of the technology in the Gulf. MEE is more efficient in power consumption among various sea water desalination plants. The MEE process has a highly attractive design and operating features that make it competitive against the dominant MSF process. There are some new innovations and current development work in MEE process that will increase its share in the future desalination market. The major feature of MEE process will be highlighted in this work together with a detailed discussion of recent innovations and developments of this remarkable process.

Keywords: Multi-effect evaporation; MEE; MED; Thermal desalination; Desalination plants